

Distraction Arthrodiastasis for the Treatment of Legg-Calve-Perthes Disease

Essay

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Abstract

The clinical presentation is usually a limp with or without pain. Quantitative classifications were made by Catterall, Salter and Thompson, Herring lateral pillar, Mose, Stulberg end result classifications which of prognostic importance and therapeutic value.

-Diagnosis is based on the clinical picture, radiography and other radiological investigations. Very high quality radiographs are needed to detect the subchondral fracture which enables us to discriminate between the cases at an earlier stage. Bone scan is a reliable method for early diagnosis and classification of the disease.

Key word:

Thyroid stimulating- Vertical line- LCPD- Legg-Calve-Perthes-
Arthrodiastasis- *Orthopaedic*

(بسم الله الرحمن الرحيم)

قَالُوا سُبْحَانَكَ لَا عِلْمَ

لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ

أَنْتَ الْعَلِيمُ الْحَكِيمُ.

(صدق الله العظيم)

البقرة آية (١٢٩).

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List of abbreviations

LCPD	Legg-Calvé-Perthes' disease.
CE angle	Center- edge angle.
HLA	Human Leukocytic Antigen.
IGF1	Insulin-like Growth Factor.
T4	Thyroxin Hormone.
TSH	Thyroid stimulating Hormone.
TFPI	Tissue Factor Pathway Inhibitor.
ESR	Erythrocyte Sedimentation Rate.
V-line	Vertical line.
MRI	Magnetic Resonance Imaging.
CT	Computerized Tomography.
A-P	Anteroposterior.

INTRODUCTION

-Legg-Calve-Perthes disease (LCPD) is a condition affecting the immature capital femoral epiphysis during childhood. The affected femoral head undergoes varying degrees of avascular necrosis for unknown reasons. The process is self limited, renders the femoral head and hip joint deformed with a limited range of motion and future risk for secondary arthritic changes ⁽¹⁾.

-The course and prognosis of Perthes' disease are variable and difficult to predict. It is widely accepted that those most at risk of a poor outcome are patients who develop the disease in later childhood ⁽²⁾.

-Modern classification of Legg-Calve-Perthes disease began with Catterall in 1971, who defined 4 types, the first two associated with a good prognosis and the 3rd and 4th associated with poor prognosis. In Herring, group (A) hips are those with no involvement of the lateral pillar of the femoral head, group (B) hips have some loss of height not exceeding 50% of the original height. Group (C) hips have more than 50% loss of height ⁽³⁾.

-The best treatment of Perthes' disease is still unknown. The main principles of treatment have traditionally been relief of loading and containment. Bed rest, traction and bracing have been used to relieve symptoms of the disease with a better outcome to be expected in the younger patients. For older children in whom the head is more at risk, surgical interventions such as pelvic and femoral osteotomies, augmentation of the acetabular shelf and muscle releases have been advocated ⁽⁴⁾.

-Perthes' disease in children above 8 years of age generally has the worst prognosis. On this age group it is common that hinge abduction appears in uncontained hip, situation that has a difficult solution with the standard surgical procedures.

-Arthrodiastasis using an external fixator is a term that describes a regime of articulated distraction. It is thought that creating a space between the bony surfaces, minimizing mechanical stress, maintaining movement and the synovial circulation will be restored ⁽⁵⁾.

-The rationale of arthrodiastasis using an external fixator in Perthes disease is that it is expected to provide true non-weight bearing, giving the femoral head a chance to heal in a relatively short time and even to remodel. It can also help to achieve containment in hips that are non-containable with the conventional methods. Another proven advantage of arthrodiastasis is the neovascularization in the distracted tissue. The space left by the distracted pins is filled by vascular granulation tissue ⁽⁵⁾.

-Ilizarov fixator and other circular external fixators are preferred because unilateral fixators can't maintain the correction achieved by the muscle release in patients with limited joint movement. Hips graded as Catterall III or IV, Herring B or C were selected for treatment, patients in later stages of the disease, those with non-containable deformities or those who lost containment after treatment procedures present a problem. The goal of performing distraction is to attempt to provide and maintain containment of such poor prognosis hips ⁽⁶⁾.

Aim of the study

The aim of this essay is to review the role of Distraction Arthrodiastasis for the treatment of Legg-Calve-Perthes disease.

Vascular Anatomy

(I) Arterial supply

The arteries of femoral head have been studied by several investigators as *Trueta*⁽⁷⁾, *Crock*⁽⁸⁾, *Chung*⁽²⁾, and others.

Trueta⁽⁷⁾ made historical review of the vasculature of the head and neck of the human femur during growth, In his paper he mentioned notes of *Hyrtil* in 1846 who mentioned that the round ligament in children had vessels that did not enter the femoral head.

Trueta⁽⁷⁾ examined 46 specimens of the upper end of the femur during growth. He gave a concise picture of the modifications of the vasculature of the human femoral head from birth to maturation; he concluded that, there are five main phases:-

Phase (1) At Birth: vessels coming from lateral side of the head proceed horizontally towards its medial side while other vessels emerge almost vertically from the top of the ossified shaft. Vessels are seen coming from the round ligament, but they are not constant.

Phase (2) Infantile:" from 4 months to 4 years." The predominant blood flow arises from the metaphyseal vessels crossing the area later to be occupied by the growth plate; the lateral epiphyseal vessels are also important, but there are no penetrating vessels coming from the ligamentum teres even if in the early days some large vessels are seen to enter the head from this source, they disappear .

Phase (3) Intermediate:" from about 4 to 7 years." The epiphyseal plate has established a firm barrier between epiphysis and metaphysis. The metaphyseal blood flow decreases to become negligible, or nearly so, while the round ligament has not yet provided vessels penetrating the epiphysis.